भारतीय मानक
Indian Standard

IS 15380 : 2023

ढलित उच्च घनत्व फाइबर (एच डी एफ) के दिल्लेदार दरवाजे के शटर — विशिष्टि

(पहला पुनरीक्षण)

Moulded High Density Fibre (HDF) Panelled Door Shutters — Specification

(First Revision)

ICS 91.060.50

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May 2023 **Price Group 7**

Doors, Windows and Shutters Sectional Committee, CED 11

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Doors, Windows and Shutters Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in 2003. Considering the rapid changes in lifestyle as well as material availabilities and acceptance of eco-friendly options in door constructions during the last two decades, this first revision in 2023 is a major makeover of the 2003 version.

In this revision, the following major modifications have been incorporated:

a) Title of the standard has been modified;
b) Moulded high density fibre (HDF) panel door shutters have been categorized in two grades that is BWP (boiling water proof) grade and MR (moisture resistance) grade;
c) A new thickness of 25 mm shutters has been added;
d) Raw material requirements have been modified as per new grades of moulded high density fibre (HDF) panel door shutters;
e) Glue adhesion test requirements have been modified as per grades of moulded high density fibre (HDF) panel door shutters; and
f) The amendment issued to the previous version of the standard has been incorporated, and the text of the standard has been suitably modified to make it more user friendly.

A scheme of labelling environment friendly products known as ECO-Mark has been instituted at the instance of the Ministry of Environment, Forests and Climate Change, Government of India. The ECO-Mark is administered by the Bureau of Indian Standards (BIS) under the *Bureau of Indian Standards Act*, 2016 as per the Resolution No. 71 dated 21 February 1991 and Resolution No. 425 dated 20 October 1992 published in the Gazette of the Government of India. For a product to be eligible for ECO-Mark, it shall also carry the Standard Mark (ISI mark) of BIS besides meeting additional environment friendly requirements. For this purpose, the Standard Mark of BIS would be a single mark being a combination of the ISI Mark and the Eco logo. Requirements to be satisfied for a product to qualify for the BIS Standard Mark for Eco friendliness, will be optional. Manufacturing units will be free to opt for ISI Mark alone also.

The ECO criteria is based on the Gazette Notification No. 170 dated 16 May 1996 for wood substitutes as environment friendly products published in the Gazette of Government of India, as revised/amended from time to time.

The composition of the committee responsible for the formulation of this standard is listed in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MOULDED HIGH DENSITY FIBRE (HDF) PANELLED DOOR SHUTTERS — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies the requirements for moulded high density fibre (HDF) panelled door shutters.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in the text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 10428, IS 707 and the following shall apply.

3.1 HDF Panel — Pre-primed, high density fibreboard, with deep moulded designs on the panel. Typical two, four and six panel designs are shown in Fig. 1 (for information only). The number of panels on the face and the design shall be as agreed to between the purchaser and the manufacturer. Typical moulded HDF paneled door shutter is shown in Fig. 2 for information.

4 TYPE AND GRADE

4.1 Door shutters shall be of the following two types:

a) Heavy Duty — Having void area less than and equal to 35 percent, and
b) Light Duty — Having void area more than 35 percent but not exceeding 65 percent.

4.2 Each type of door shutter shall be further classified in two grades as follows:

a) BWP (Boiling Water Proof) Grade — Such door shutters recommended for use at humid as well as dry locations.
b) MR (Moisture Resistance) Grade — Such door shutters recommended for use in dry locations only.

5 SIZES

5.1 Sizes of the door shutters shall conform to the modular sizes specified in Table 1. Other sizes, that is width and height, as agreed to between the manufacturer and the purchaser, may also be permitted provided they are in modules of 5 mm.

5.2 The nominal thickness of the shutters shall be 25 mm, 30 mm and 35 mm (*see* Table 1). As agreed to between manufacturer and the purchaser, the other thickness may also be permitted; provided, the thickness of shutters in such cases shall be equal to or more than that specified against the nearest higher modular sizes. However, for sizes greater than 10 DS 21 and 12 DT 21, the thickness of such shutters shall be greater than 35 mm and shall be as agreed to between the manufacturer and the purchaser.

6 MATERIAL

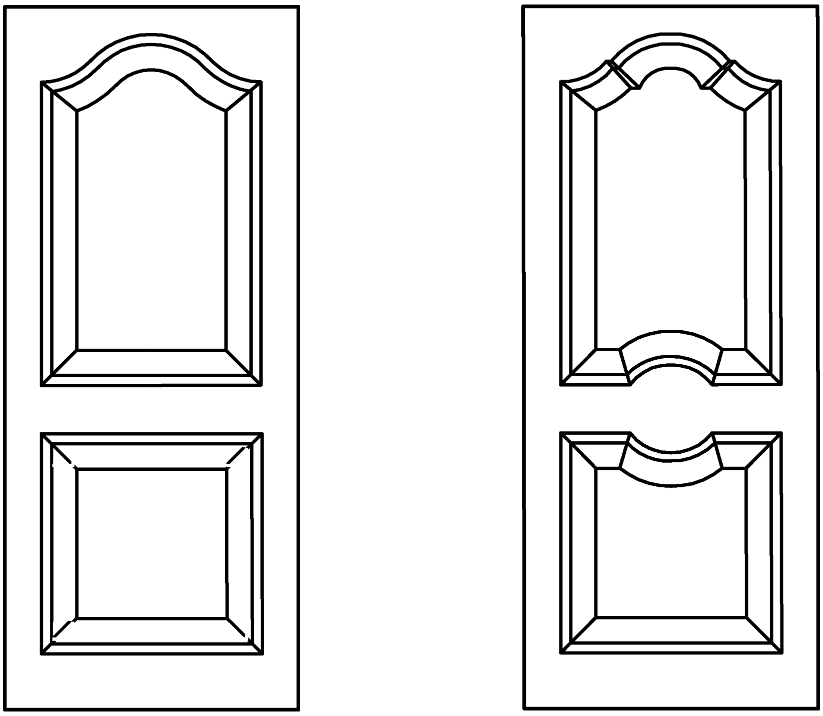
6.1 Timber

6.1.1 Any species of timber having minimum bulk density of 450 kg/m^3 at 12 percent moisture may be used for rails, stiles in fabrication of door shutters.

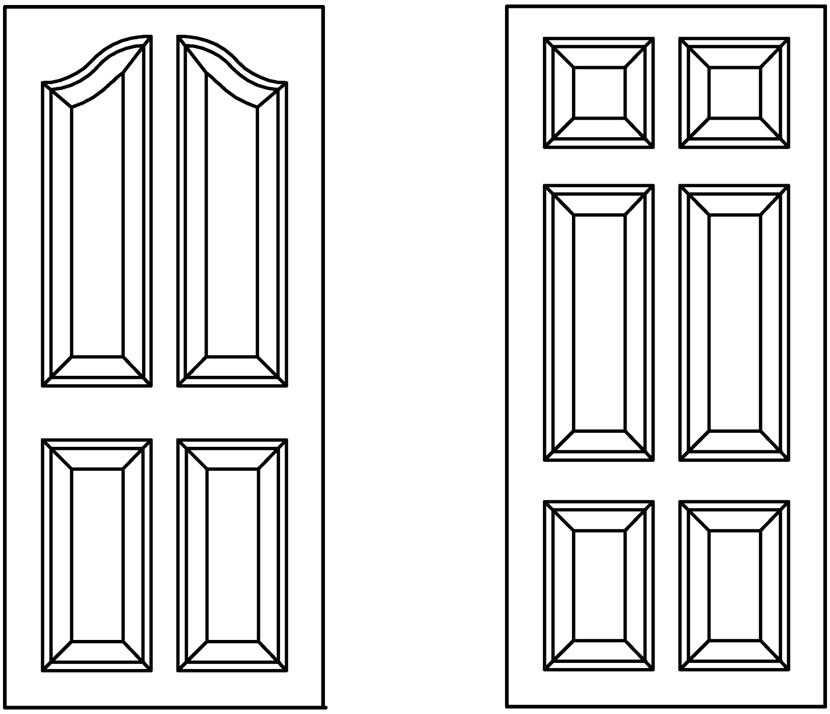
6.1.2 The moisture content in timbers used in the manufacture of door shutters shall be not more than 12 percent when tested according to IS 1708 (Part 1).

6.1.3 Timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross section of the members in which they occur may be permitted. Pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members.

6.1.4 Timber shall be preservative treated before assembly as given in **6.1.4.1**. Alternatively, the kiln dried timber already heat treated at 56 °C with its core temperature maintained for 30 min can be used, provided if they meet with the screw withdrawal test as specified in **11.14**.



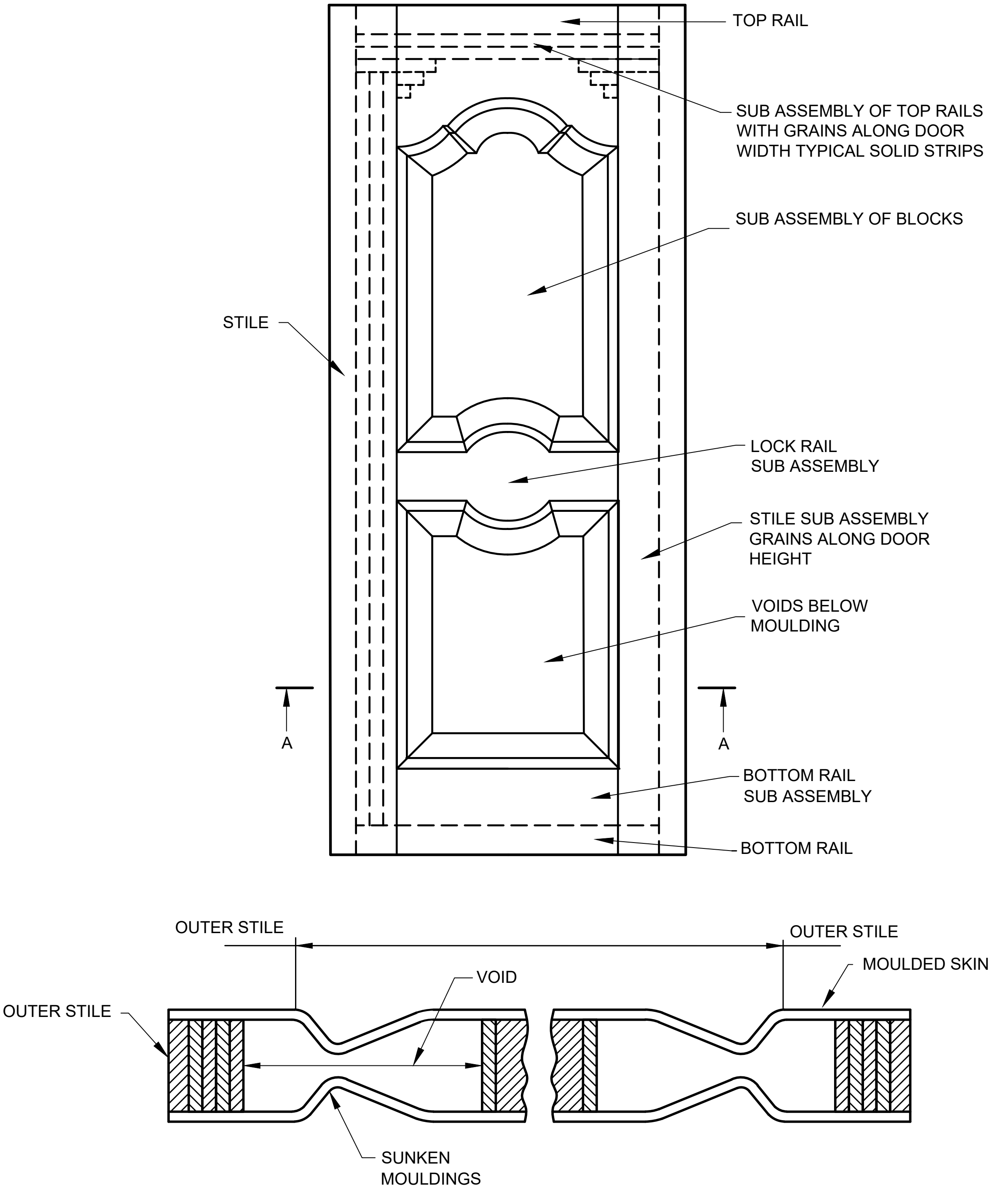
1A TWO PANEL DOORS



1B FOUR PANEL DOORS

1C SIX PANEL DOORS

FIG. 1 TYPICAL DESIGNS OF DOOR SHUTTER WITH 2, 4 AND 6 PANELS



ENLARGED SECTION AT A-A

FIG. 2 TYPICAL MOULDED HDF PANEL DOOR SHUTTER

Table 1 Dimensions of Moulded HDF Panelled Door Shutters
[*Clauses* 5.1, 5.2 *and* 14.1(c)]

Sl No. (1)	Designation of Door Shutters (2)	Nominal Width mm (3)	Nominal Height mm (4)	Thickness mm (5)
i)	8 DS 20	700	1 905	25 or 30
ii)	8 DS 21	700	2 005	
iii)	9 DS 20	800	1 905	30
iv)	9 DS 21	800	2 005	
v)	10 DS 20	900	1 905	35
vi)	10 DS 21	900	2 005	
vii)	12 DT 20	1 100 (*see* Note 4)	1 905	35
viii)	12 DT 21	1 100 (*see* Note 4)	2 005	

NOTES

1 D = Door, S = single shutter, and T = Double leaf shutter.

2 The designation indicates the size of door opening, the first number referring to width in modules of 100 mm and the last number the height in modules of 100 mm.

3 Standard sizes of door frames are covered in IS 4021 and IS 4351.

4 Combined width of two shutters in closed position.

6.1.4.1 For preservative treatment the timber shall be soaked in 1.25 percent solution of boric acid or 1.9 percent solution of borax at a temperature of 85 °C to 90 °C for a period of 10 min to 40 min depending upon the species and thickness, or the timber may be dipped in a 2 percent to 3 percent solution of boric acid or 3 percent of borax for 2 min and then block stacked for at least 2 h. Alternatively, it may be soaked at ambient temperature in a 2 percent solution of sodium pentachlorophenate in water for a period of 2 min and then stacked for at least half an hour before drying. Timber should be dried to less than 12 percent moisture content. Qualitative test shall be conducted according to IS 401 for determining the presence of preservative used.

6.2 Moulded Panel Fibre Board Skin

Moulded panel fibre board skin used in door shutters shall be of minimum thickness 3 mm, of BWP type synthetic resin (conforming to IS 848) bonded high density fibre board conforming to the requirement given in Table 2.

6.3 Particle Boards as Core

Particle board used for the core of the door shutter shall be flat pressed or extruded tubular or extruded solid. However, the swelling of the particle board in thickness, when tested in accordance with IS 2380 (Part 17) shall not exceed 5 percent.

6.4 Adhesive

Adhesives used for bonding face skins and core shall be adhesive conforming to BWP grade specified in IS 848 for BWP grade door shutter and MR grade specified in IS 848 for MR grade door shutter.

6.5 Alternative Materials

Laminated veneer lumber (LVL) confirming to IS 14616, veneer laminated lumber (VLL) confirming to IS 16171, Medium Density Fibre (MDF) Boards conforming to Grade 1 of IS 12406 and HDF boards (density > 900 kg/m^3) may be also used for rails, stiles in fabrication of door shutters.

Table 2 Requirements for Moulded Panel Fibreboard Skin
[*Clauses* 6.2 *and* 14.1 (c)]

Sl No.	Requirements	Permissible Limits	Method of Test, Ref to IS
(1)	(2)	(3)	(4)
i)	Density, kg/m^3, *Min*	900	2380 (Part 3)
ii)	Moisture content, percent, *Max*	8	2380 (Part 3)
iii)	Water absorption, percent, *Max*		2380 (Part 16)
	After 2 h	16	
	After 24 h	36	
iv)	Swelling in water, percent, *Max*		2380 (Part 17)
	a) General absorption, 24 h		
	1) Thickness	20	
	2) Length	0.70	
	3) Width	0.70	
	b) Surface absorption	9	
v)	Modulus of rupture, N/mm^2, *Min*	35	2380 (Part 4)
vi)	Internal bond strength, N/mm^2, *Min*		2380 (Part 5)
	a) Wet state	1.0	
	b) Dry state (2 h boiling)	0.3	
vii)	Immersion in boiling water at (100 ± 3) °C for 4 h	No disintegration	
viii)	Formaldehyde emission, mg/100 g, *Max*	8	13745

7 CONSTRUCTION

7.1 Stiles, Rails and Sub-Assembly/Core

7.1.1 Stiles and rails shall be of minimum 40 mm width with following details and can have one finger or one scarf type glued joints (for timber stiles only):

a) Joint shall be located between 300 mm to 500 mm from centreline of door shutter;
b) In case of scarf joint it shall be diagonally cut at an angle of maximum 30 degree to horizontal; and
c) The joints to both the stiles can be located diagonally opposite to each other.

The rails shall be made without any joints.

In case of alterative materials (*see* **6.5**), the outer stile and rail shall be of timber or LVL or VLL and shall be of at least be 40 mm after trimming and sizing.

7.1.2 Below the moulded panels, there shall be a sub-assembly of blocks and/or strips of wood (preferably from one species or different species having similar physical-mechanical properties) or alternative materials (*see* **6.5**) with voids limited within the limits as per **4.1**, jointed or laid side by side in the void space to form a structurally integral raised panel after pressing. Wooden strips shall be cut from treated timbers seasoned to a moisture content less than 12 percent. Width of each strip of wood shall not exceed 50 mm. These strips may consist of pieces of small lengths placed end to end with end joints staggered.

7.1.3 Alternatively, solid or tubular particle boards can be used as core material as referred to in **6.3** with voids (*see* **4.1**) as a substitute to wood strips.

7.1.4 The thickness of sub-assemblies shall be such that after pressing the final specified thickness shall be attained.

7.2 Empanelment

Panel fibre board skin shall be glued on either side of the sub-assembly using synthetic resin adhesive (*see* **6.4**) and pressed under heat and pressure.

7.3 Lipping

Lipping shall be provided, if so desired by the purchaser. Lipping where provided, may be internal or external as specified by the purchaser. Joints shall be either scarf or finger jointed. External lipping where provided, door shutters shall have edge lipped by solid timber and shall measure at least 6 mm on the face of the door shutter or by any other edge bending (as agreed to between the manufacturer and the purchaser) and shall be glued using a moisture resistant glue.

7.4 Rebating

In the case of double-leaf shutters, the meeting of the stiles shall be rebated by 8 mm to 10 mm. The rebating shall be either splayed or square type. Where lipping is provided, the depth of lipping at the meeting of stiles shall not be less than 30 mm.

7.5 Opening for Glazing

Glazing may be provided as required by the purchaser, by cutting out panels. Internal structure and handing for affixing panel shall be as agreed to between the purchaser and the manufacturer.

8 ADDITIONAL FITTINGS

8.1 Locks

Shutters shall be shop prepared for taking any suitable type of locks or latches as may be agreed to between the manufacturer and the purchaser. Shop preparing the door shutter with morticed holes for lock fixing shall be done only when desired by the purchaser.

8.1.1 Other fittings such as pull bolt, etc, shall be provided as agreed to between the purchaser and the manufacturer.

9 WORKMANSHIP AND FINISH

9.1 All the four edges of the door shutter shall be square.

9.2 The surfaces of the shutter shall be pre-primed. The shutter may be supplied either in textured or smooth surface finish as agreed to between the purchaser and the manufacturer.

10 TESTS

10.1 Classification of Tests

10.1.1 *Acceptance Tests*

The following tests shall constitute product (acceptance of lot on batch to batch basis) tests:

a) Dimensions and squareness test,
b) General flatness test,
c) Local planeness test,
d) End immersion test,
e) Glue adhesion test, and
f) Slamming test.

10.1.2 *Type Tests*

The following tests shall constitute product approval (of a given construction or a prototype of door shutters) type tests:

a) Dimensions and squareness test,
b) General flatness test,
c) Local planeness test,
d) Impact indentation test,
e) Flexure test,
f) Edge loading test,
g) Shock resistance test,
h) Buckling resistance test,
j) Slamming test,
k) Misuse test,
m) Varying humidity test,
n) End immersion test,
p) Glue adhesion test, and
q) Screw withdrawl resistance test.

11 REQUIREMENTS

11.1 Dimensions and Squareness Test

Door shutters when tested in accordance with IS 4020 (Part 2), the dimensions of the nominal width and height shall be within a limit of +5 mm. The door shutter shall not deviate by more than 1 mm on a length of 500 mm. The thickness of the door shutter shall be uniform throughout with the permissible variation of not more than 0.8 mm between any 2 points. The nominal thickness of the shutter shall be within a limit of ±1 mm.

11.2 General Flatness Test

Door shutters when tested in accordance with IS 4020 (Part 3), the twist, cupping and warping shall not exceed 6 mm.

11.3 Local Planeness Test

Door shutters when tested in accordance with IS 4020 (Part 4), the depth of deviation measured at any point shall not be more than 0.5 mm. Measurement should be taken in a way to avoid the areas etched for simulated grain effect.

11.4 Impact Indentation Test

Door shutters when tested in accordance with IS 4020 (Part 5), on the flat part of the empanelment shall have no defects cracking, tearing and delamination and the depth of indentation shall not be more than 0.2 mm.

11.5 Flexure Test

Door shutters when tested in accordance with IS 4020 (Part 6), the deflection at the maximum load shall not be more than one thirtieth of the length and one fifteenth of the width, whichever is less. On removal of the loads, the residual deflection shall not be more than one tenth of the allowable maximum deflection.

11.6 Edge Loading Test

Door shutters when tested in accordance with IS 4020 (Part 7), the deflection of the edge at the maximum load shall not be more than 5 mm. On removal of the loads, the residual deflection shall not be more than 0.5 mm, failing which the test may be repeated on the other edge in the reverse direction. Also, there shall be no lateral buckling by more than 2 mm during loaded condition and no residual lateral buckling after removal of the load.

11.7 Shock Resistance Test

Door shutters when tested in accordance with IS 4020 (Part 8), for soft and light body impact, there shall be no visible damage in any part of the door shutter after fifteen blows. When tested for soft and heavy body impact, the normally hung door shutter with hangings, fixings and fastenings shall withstand without any significant permanent deformation and without deterioration the five impacts on both sides of the shutter.

11.8 Buckling Resistance Test

Door shutters when tested in accordance with IS 4020 (Part 9), shall not show any deterioration and any residual deformation more than 5 mm after 15 min of unloading and initial deflection also shall not be more than 50 mm.

11.9 Slamming Test

Door shutters when tested in accordance with IS 4020 (Part 10), shall not have any visible damage in any part of the door shutter at the end of 50 successive impacts in the horizontal position.

11.10 Misuse Test

Door shutters when tested in accordance with IS 4020 (Part 11), there shall not be any permanent deformation of the fixing or any other part of the door set in hindering its normal working after the test.

11.11 Varying Humidity Test

Door shutters when tested in accordance with IS 4020 (Part 12), there shall not be any visible warping, twisting or delamination and where precision is required the maximum departure from the general planeness shall not be more than 1.0 mm. The maximum the recovery of the original size after subjecting the door shutter to high and low humidity shall be at least 90 percent of the change in dimensions.

11.12 End Immersion Test

Door shutters when tested in accordance with IS 4020 (Part 13), shall be no delamination at the end of the test. Glue lines between the HDF panel faces and the stile and rail shall be examined for delamination in the immersed portion of the shutter. The immersion cycles for MR grade door shutter shall however be three.

11.13 Glue Adhesion Test

Door shutters, when tested in accordance with IS 4020 (Part 15), shall be considered to have passed the test if no delamination has occurred in the glue lines between the HDF panel faces and stile and rail. Delamination at a knot, knot hole, a pitch pocket and wormhole or other permissible wood defects shall not be considered in assessing the sample. A door shutter shall be deemed to have passed the test if both the specimen tested passed the test. However, in the test for MR grade. The water with submerged specimen shall be bought to (60 ± 2) °C in the place of boiling water.

11.14 Screw Withdrawal Resistance Test

Edge of door shutters, when tested in accordance with IS 4020 (Part 16), the required load to withdraw the screw completely shall not be less than 1 000 N. On withdrawal, there shall be no visible damage to the surface either by delamination or extra chipping off at the points of withdrawal. In case, if it is not possible to take specimens of size as given in IS 4020 (Part 16), the test shall be carried out on specimens of size 150 mm x actual width of longitudinal edge of the door shutter.

12 SAMPLING AND CRITERIA FOR CONFORMITY

12.1 Lot

In any consignment, all the shutters of the same type and grade and manufactured under similar conditions of production shall be grouped together to constitute a lot.

12.2 Sample Size

12.2.1 The number of specimens to be taken for testing of shutters for dimensions and squareness test, flatness test, and local planeness test shall be in accordance with col (3) of Table 3.

12.2.2 For glue adhesion test, slamming test and end immersion test the number of shutters shall be as per col (5) of Table 3.

12.2.3 For impact test and screw withdrawal resistance test, shutters shall be tested on production of the same size, thickness, grade and type.

12.2.4 For flexure test, edge loading test, shock resistance test, misuse test, varying humidity test and buckling resistance test the shutters shall be tested once a year and whenever the design and construction is changed.

12.3 Criteria for Conformity

The lot shall be declared as conforming to the requirements of the standard when the number of defective samples does not exceed the permissible number given in col (3) of Table 3.

Table 3 Sample Size and Criteria for Conformity

(*Clauses* 12.2 *and* 12.3)

Sl No. (1)	Lot Size (2)	Sample Size (3)	Permissible No. of Defective Samples (4)	Sub-sample Size (5)
i)	26 to 30	8	0	1
ii)	51 to 100	13	1	2
iii)	101 to 150	20	1	2
iv)	151 to 300	32	1	3
v)	301 to 500	50	2	4
vi)	501 and above	80	2	5

NOTE — For lot size 25 or less, number of samples to be taken for testing shall be as agreed to between the manufacturer and the purchaser.

13 ADDITIONAL REQUIREMENTS FOR ECO MARK

13.1 Door shutters shall be manufactured from wood from sources other than natural forests such as timber from industrial and social forestry plantations, shade trees from tea and coffee estates, etc, as applicable to various components under **6** and such doors shutters shall conform to the requirements of quality and performance as specified in this standard as well as the requirements of ECO Mark for all the referred standards.

NOTES

1 The manufacturers shall provide documentary evidence by way of certificate or declaration to Bureau of Indian Standards which applying for ECO Mark.

2 The manufacturer shall provide BIS environmental consent clearance from the concerned State Pollution Control Board as per the provisions of the *Water (Prevention and Control of Pollution) Act* 1974 and *Air (Prevention and Control of Pollution) Act* 1981 along with the authorization, if required under the *Environment (Protection) Act* 1986, while applying for ECO Mark.

14 MARKING

14.1 Each shutter shall be legibly and indelibly marked on any of its edges with the following information:

a) Name of the manufacturer or trade-mark, if any;
b) Type and Grade of door shutter;
c) Designation as specified in Table 1 of the standard for modular sizes; or the actual size (width and height) for non-modular sizes along with appropriate designation for door shutters as given in 'Table 1';
d) Thickness of door shutters;
e) Species of timber, in case of ECO Mark; and

f) The criteria for which the MDF board has been labelled as ECO-Mark (in case the door shutter has been marked with ECO-Mark) (*see* Foreword).

14.2 BIS Certification Marking

14.2.1 The door shutters may be marked with Standard Mark as per the conformity assessment schemes governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made there under. The details of conditions for the licence may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
401 : 2001	Preservation of timber — Code of practice (*fourth revision*)
707 : 2011	Timber technology and utilization of wood, bamboo and cane — Glossary of terms (*third revision*)
848 : 2006	Synthetic resin adhesive for plywood (phenolic and aminoplastic) — Specification (*second revision*)
1708 (Part 1) : 1986	Methods of testing of small clear specimens of timber: Part 1 Determination of moisture content (*second revision*)
2380	Methods of test for wood particle boards and boards from other lignocellulosic materials (*first revision*)
(Part 3) : 1977	Determination of moisture content and density
(Part 4) : 1977	Determination of static bending strength (modulus of rupture and modulus of elasticity in bending)
(Part 5) : 1977	Determination of tensile strength perpendicular to surface
(Part 16) : 1977	Determination of water absorption
(Part 17) : 1977	Determination of swelling in water
4020	Door shutters — Methods of tests (*third revision*)
(Part 2) : 1998	Measurement of dimensions and squareness
(Part 3) : 1998	Measurement of general flatness
(Part 4) : 1998	Local planeness test
(Part 5) : 1998	Impact indentation test
(Part 6) : 1998	Flexure test
(Part 7) : 1998	Edge lodging test
(Part 8) : 1998	Shock resistance test
(Part 9) : 1998	Buckling resistance strength
(Part 10) : 1998	Slamming test
(Part 11) : 1998	Misuse test
(Part 12) : 1998	Varying humidity test
(Part 13) : 1998	End immersion test
(Part 15) : 1998	Glue adhesion test
(Part 16) : 1998	Screw withdrawal resistance test
4021 : 1995	Timber door, window and ventilator frames — Specification (*third revision*)
4351 : 2003	Steel door frames — Specification (*second revision*)
10428 : 2022	Windows and Pedestrian doors — Vocabulary (first revision)
12406 : 2021	Medium density fibre boards for general purpose — Specification (*second revision*)
13745 : 2020	Method for determination of formaldehyde content in wood-based panels by extraction method called perforator method (*first revision*)
14616 : 1999	Laminated veneer lumber
16171 : 2014	Veneer laminated lumber

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Doors, Windows and Shutters Sectional Committee, CED 11

Organization	*Representative(s)*
In Personal Capacity (*B - 094, Trinity Towers DLF Phase - V, Sector 53 Gurugram, 122002*)	Shri R. K. Kakar (***Chairperson***)
APL Apollo Tubes Limited, Ghaziabad	Shri Tapesh Gupta
Aluminium Association of India, Bengaluru	Dr Pradyumna Kumar Pradhan
B. G. Shirke Construction Technology Limited, Pune	Col (Retd) Sanjay M. Adsar Shri Y. B. Pathan (*Alternate*)
Bhoruka Extrusions Private Limited, Mumbai	Shri Makoto Ishihara Shri Om Prakash Verma (*Alternate*)
Builders Association of India, Chennai	Shri Sudip Kumar Dutta Shri M. Sathyanarayanamurthy (*Alternate*)
Central Institute of Plastics Engineering & Technology, Chennai	Dr S. N. Yadav Dr R. K. Singh (*Alternate*)
Central Public Works Department, New Delhi	Shri A. K. Sharma Shrimati Nandini Mukhopadhyay (*Alternate*)
CSIR–Central Building Research Institute, Roorkee	Dr B. Singh Dr S. R. Karade (*Alternate*)
Delhi Development Authority, New Delhi	Representative
Engineers India Limited, Chennai	Shri Samir Das Shrimati Jyotsna Shridhar (*Alternate* I) Shri Akhilesh Maurya (*Alternate* II)
Forest Research Institute, Dehradun	Shri Vimal Kothiyal Shri D. P. Khali (*Alternate*)
Glazing Society of India, Chennai	Shri G. N. Gohul Deepak Shri Naveen Karki (*Alternate*)
Greenlam Industries, Kolkata	Shri Inder Kochhar
Hindalco Industries Limited, Mumbai	Shri A. Jayagopal Shri Chandan Agrawal (*Alternate*)
Indian Buildings Congress, New Delhi	Shri Hitesh Paul Gupta
Indian Plywood Industries Research & Training Institute, Bengaluru	Shri Anand Nandanwar
Jindal Aluminium Limited, Bengaluru	Representative

Organization	*Representative(s)*
Military Engineer Services, Engineer-in-Chief's Branch, Integrated HQ of MoD (Army), New Delhi	SHRIMATI RIVOO MAHENDRU SHRI KULBHUSHAN JAIN (*Alternate*)
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NBCC (India) Limited, New Delhi	SHRIMATI RESHMA DUDHANI SHRI ANUJ KUMAR GOYAL (*Alternate*)
National Test House, Kolkata	SHRI D. V. S. PRASAD SHRI ALOKE DE (*Alternate*)
Rajshri Plastiwood, Indore	SHRI RAVI BARJATYA SHRI ANURAG TANDON *(Alternate*)
Reliance Industries Limited, Mumbai	SHRI JAYESH M. DESAI SHRI AMIT J. SHAH (*Alternate*)
Rubber Board, Kottayam	SHRI N. RAJGOPAL SHRI JIMMY THOMAS (*Alternate*)
School of Planning and Architecture, New Delhi	REPRESENTATIVE
Schueco India Private Limited, Bengaluru	SHRI ANTONY JOHN SHRI SUBIN CALVIN GEO (*Alternate*)
Shakti Hormann Private Limited, Secunderabad	SHRI SYED MOHAMED SHRI MAHESH SINGH (*Alternate*)
Sintex BAPL Limited, Pune	SHRI PRASHANT TRIVEDI SHRI PRADEEP M. SHESHADRI (*Alternate*)
Sleek Boards India LLP, Pune	SHRI NITIN VAZE SHRI AMIT VAZE (*Alternate*)
The Indian Institute of Architects, New Delhi	REPRESENTATIVE
UPVC Windows & Door Manufactures Association, New Delhi	SHRI MARIO SCHMIDT SHRI ULLAS GULIANI (*Alternate*)
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